

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date
15 January 2004 (15.01.2004)

PCT

(10) International Publication Number
WO 2004/005702 A1

(51) International Patent Classification⁷: F02M 59/46, 47/02, 45/08

(21) International Application Number: PCT/GB2003/002668

(22) International Filing Date: 20 June 2003 (20.06.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data: 0215490.4 4 July 2002 (04.07.2002) GB

(71) Applicant (for all designated States except US): DELPHI TECHNOLOGIES, INC. [US/US]; P.O. Box 5052, Troy, MI 48007 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): HARCOMBE, Anthony, T. [GB/GB]; 1 Warren Avenue, Richmond, Surrey TW10 5DZ (GB). WILLIAMS, Anthony [GB/GB]; 39 Sussex Avenue, Isleworth, Middlesex TW7 6LJ (GB). MALE, Andrew [GB/GB]; 106 Carlton Road, Walton on Thames KT12 2DQ (GB).

(74) Agents: KELTIE, David, Arthur et al.; David Keltie Associates, Fleet Place House, 2 Fleet Place, London EC4M 7ET (GB).

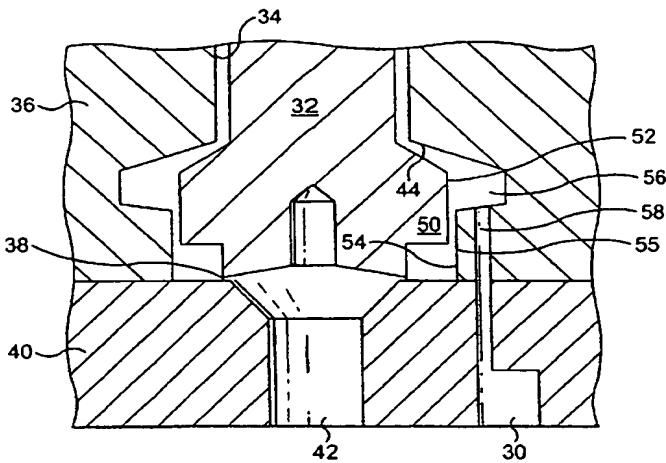
(81) Designated States (national): JP, US.

(84) Designated States (regional): European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR).

Published: — with international search report

[Continued on next page]

(54) Title: CONTROL VALVE ARRANGEMENT



WO 2004/005702 A1

(57) **Abstract:** A control valve arrangement for use in controlling fuel pressure within a control chamber (30) includes a control valve member (32) which is movable between a first position in which the control chamber (30) communicates with a source of high pressure fuel, and a second position in which the control chamber (30) communicates with a low pressure fuel drain and communication between the control chamber (30) and the source of high pressure fuel is broken. The control valve arrangement also includes restricted flow means (55, 70, 86) for restricting the rate of flow of fuel from the control chamber (30) to the low pressure fuel drain when the control valve member (32) is moved from the first position to the second position. It is desirable for the restricted flow means to be configured and arranged such the rate of flow of fuel from the source of high pressure fuel to the low pressure drain for the period of time for which the control valve member (32) is moving between the second position and the first position is also restricted.